

# **Instruction Manual for ELECTRICAL TECHNICAL ASSISTANCE for MS-6 / EM / HS-6 / EH washing machines**

**LOGI control  
COIN control  
INTELI control**

**Guidelines for verifying and locating  
faults**

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## ELECTRICAL TECHNICAL ASSISTANCE MANUAL

### INTRODUCTION

This Electrical Technical Assistance Manual for washing machines is a compilation of operating information for the electrical circuits of the inverter / motor of the HS-6 / EH and MS-6 / EM series washers, designed to facilitate inspection, maintenance, fault location and repair operations.

Before any intervention and as a safety measure it is vital to consider all of the **SAFETY INSTRUCTIONS** that accompany this introduction.

### SAFETY INSTRUCTIONS



#### WARNING!

#### INSPECTION, MAINTENANCE OR REPAIR OPERATIONS.

- The interventions described in these instructions must only be performed by **AUTHORIZED SERVICE PERSONNEL**, adequately trained by Girbau S.A. or by a Girbau S.A. dealer.
- The company responsible for the Authorized Service Personnel fully assumes liability for the intervention and any possible consequences that may derive from it.
- Any intervention performed by personnel who are not authorized by the manufacturer will be considered inappropriate and will automatically lead to the loss of the washer's guarantee
- The manufacturer takes no responsibility for any physical and / or material damages deriving from the intervention of unauthorized persons
- Compliance with the safety warnings listed in the Installation Manual is obligatory. Read them before servicing the washer.
- Avoid operating the machine without having first carefully read the washer's installation and operating manuals, paying special attention to the safety warnings.
- Conducting inspections, maintenance, repairs, cleaning operations or interventions upon the machine without taking safety measures or having the necessary technical competence can cause **ELECTRICAL SHOCK OR SERIOUS ACCIDENTS**.
- **BEFORE CONDUCTING** inspections, adjustments, repairs, maintenance, cleaning operations or interventions upon the machine, **DISCONNECT ALL POWER SOURCES**:
  - Disconnect **COMPLETELY** the washer from the mains supply and prevent its accidental connection by mechanically locking the external automatic switch and / or the switch breaker. Stopping the machine using the **NORMAL STOP** button is not sufficient.
  - Disconnect the electrical connection from the external dosing unit to the washer. These circuits are independent of the power supply to the washer.
  - Wait a minimum of five minutes in order to eliminate the risk of residual voltage.
  - Close and mechanically lock the manual feed valves of the **WATER, GAS, STEAM, HOT OIL, COMPRESSED AIR...**
  - Check that the bath has been **COMPLETELY** drained, that all parts have cooled down and that no parts are moving due to inertia
- **WARNING!** The process for localizing certain anomalies requires the checking of areas of the electric circuit whilst the washer is connected to the mains supply and to other power sources. During the completion of these actions, respect the following rules:
  - The appropriate checks must be carried out by **A SINGLE PERSON**.
  - During these operations, **ONLY** disassemble the protection covers of the electric circuits and / or the inverter. Never disassemble the covers from the moving parts of the machine.

## WASHERS EQUIPPED WITH DANFOSS INVERTER.

### INVERTER POWER ACCORDING TO WASHER MODEL.

**600W Inverter.** Models HS-6008, EH020, MS-610, EM025

**1800W Inverter.** Models HS-6013/17, EH030/40, MS-613/17/23, EM30/40/55.

### SUMMARY TABLE OF ANOMALIES OR INTERVENTIONS

DESCRIPTION OF ANOMALY OR INTERVENTION		INFORMATION DISPLAY LC/CC control	INFORMATION DISPLAY IC control
1	<b>Anomaly caused by communication failure</b> between microprocessor board and inverter	VAR 0	Alarm 2
2	<b>Anomaly caused by overcurrent</b> in inverter	VAR 03	Alarm 5
3	<b>Anomaly caused by overvoltage</b> in inverter D.C. bus	VAR 05	Alarm 7
4	<b>Anomaly caused by disconnection of thermal protection</b> of drum motor	VAR 04	Alarm 6
5	<b>Anomaly caused by overtemperature</b> in inverter	VAR 06	Alarm 8
6	<b>Washers with 600W inverter.</b> <b>General checks</b> of the electrical installation related to the inverter <b>Other anomalies</b> related to the inverter	<b>Any alarm related to the inverter / motor</b>	- - - - -
7	<b>Washers with 1800W inverter</b> Anomaly caused by incorrectly identified inverter.	VAR 09	Alarm 12
8	<b>Washers with 1800W inverter</b> <b>General checks</b> of the electrical installation related to the inverter <b>Other anomalies</b> related to the inverter	<b>Any alarm related to the inverter / motor</b>	

### DETAIL OF THE INTERVENTIONS FOR VERIFYING OR LOCATING ANOMALIES

The interventions designed for verifying and locating faults are detailed below, in the same order as in the summary table.

**Supplement the following instructions with the diagram and the corresponding parts view of the washer.**



#### VERY IMPORTANT!

Before connecting the washer to the power supply, consider the following precautions:

- The inverter must be properly mounted on the corresponding support and have all of the ground connections securely fixed in place.
- The inverter support must be connected to the washer's ground circuit.

Failure to comply with these warnings can cause **ELECTRICAL SHOCK OR SERIOUS ACCIDENTS** and can lead to the destruction of the inverter.

## 1.- COMMUNICATION ANOMALY BETWEEN MICROPROCESSOR BOARD AND INVERTER

### Alarm codes:

- control **LC/CC**: VAR 0
- control **IC**: alarm no. 2

### Description.

The alarm is activated if, at the start of or during the wash cycle, the communication between the washer microprocessor and the motor control inverter is interrupted.

### Microprocessor response.

Prevents or interrupts the execution of the wash cycle  
Connects the buzzer.

### Observations.

The check of the inverter communication circuit should be made after the start order for a wash cycle has been given or during the operating stages of the drum running the TEST program.

The inverter power supply voltage comes from:

- 1Ph+N and 2Ph machines: washer power supply.
- 200...240V machines. 3Ph: two phases of the washer power supply.
- 380...415V machines. 3Ph+N: phase and neutral of the washer power supply.

Models HS-6008/EH020 and MS-610/EM025. For reasons of electrical safety, access to the inverter should be made via the lower front cover.

Before working on the inverter, check that the S2 microswitch (consult the washer's electrical diagram) connects the motor ground to the machine's general ground connection when this cover is removed.

Step	Check		Action
1	Correct voltage in inverter power supply terminals: 600W inverter: L1 ↔ N terminals 1800W inverter: MK1 ↔ MK2 terminals.	NO	600W inverter: go to step 6 1800W inverter: go to step 9
		YES	Go to step 2
2	Power supply voltage of communication circuit is equal to 5(±0.1)V.DC. in terminals X7-4 ↔ X7-1	NO	Replace microprocessor board A1
		YES	Go to step 3
3	Power supply voltage of communication circuit is equal to 5(±0.1)V.DC. in terminals MK20-4 ↔ MK20-1	NO	Check communication connection between microprocessor and inverter (boards A1 and A2): cable, connections, terminals...
		YES	Go to step 4
4	Communication voltage of 1.8V.DC. (±0.3) in board A1 (terminals X7-3 ↔ X7-2) This voltage should be measured after a wash cycle has been started. At regular intervals, of a maximum of 5 seconds, oscillations of ±0.3V.DC should be registered	NO	Replace microprocessor board A1
		YES	Go to step 5
5	Communication voltage of 1.8V.DC. (±0.3) in board A2 (terminals MK20-3 ↔ MK20-2) This voltage should be measured after a wash cycle has been started. At regular intervals, of a maximum of 5 seconds, oscillations of ±0.3V.DC should be registered	NO	Check communication connection between microprocessor and inverter (boards A1 and A2): cable, connections, terminals...
		YES	Possible inverter failure. Replace inverter (board A2)
6	(600W inverter) Correct voltage between cable N and terminal X2-3	NO	Go to step 7
		YES	Check inverter power supply connection (board A2): cabling, connections, terminals...

## 1 (cont.)- Communication anomaly between microprocessor board and inverter

Step	Check		Action
7	(600W inverter) Check continuity of fuse F2	NO	Check for possible shortcircuit in inverter power supply circuit (board A2) If no reason for melting of fuse is detected, replace fuse. In the case of repeated fuse melting, replace inverter (board A2).
		YES	Go to step 8
8	(600W inverter) Correct voltage between cable N and terminal X1.	NO	Check circuit between machine current input and terminal X1.
		YES	Possible contact fault in relay K3. Replace microprocessor board A1.
9	(1800W inverter) Correct voltage at input to filter Z1	NO	Go to step 10
		YES	Replace filter Z1( <b>Note 1</b> )
10	(1800W inverter) Check continuity of fuse F6	NO	Check for possible shortcircuit in inverter power supply circuit (A2) If no reason for melting of fuse is detected, replace fuse. In the case of repeated fuse melting, replace filter. If problem persists, replace inverter.
		YES	Go to step 11
11	(1800W inverter) Check connection of inverter relay KA1.	NO	Go to step 12
		YES	Check circuit between main machine switch and terminals 2 and 6 of KA1.
12	Check power supply (12V.DC) of relay coil KA1 from terminals X17-1↔X17-4 on board A1	NO	Possible microprocessor failure. Replace microprocessor (board A1)
		YES	Replace relay KA1.

### Note 1:

- If in doubt over the correct operation of the filter and **only during the checking process**, the filter can be by-passed and the inverter can be connected directly to the power supply.
- By design and owing to the earth discharge, it is correct to detect ohmic continuity between the terminals of the filter and the earth.

## 2.- ANOMALY CAUSED BY OVERCURRENT IN INVERTER

### Alarm codes:

- control **LC/CC**: **VAR 03**.
- control **IC**: alarm no. **5**.

### Description.

The overcurrent alarm is activated if the inverter detects excessive consumption in the outlet towards the motor, whether caused by a shortcircuit or by an excessive charge.

### Microprocessor response.

Prevents or interrupts the execution of the wash cycle.

### Observations.

Irregularities in the power supply voltage or unstable power supply and ground circuit connections in the washer can also trigger this alarm. Also consult the section on **GENERAL CHECKS**.

Step	Check		Action
1	Stable inverter power supply voltage and of a value between 200 and 240V ( $\pm 10\%$ )	<b>NO</b>	Rectify the problem. (also consult section 1.- COMMUNICATION ALARM)
		<b>YES</b>	Go to step 2
2	Phase failure in the motor caused by deterioration to the wiring, connections or motor coils. (check with an RMS amperometer) Other motor defects.	<b>NO</b>	Go to step 3
		<b>YES</b>	Rectify defect If motor failure is detected, replace motor
3	Disconnect connector MK-3 from the inverter output. (To avoid triggering the motor's thermal protection disconnection alarm, by-pass the connection terminals of this protection's circuit: -600W inverter: by-pass terminals M3-4 $\leftrightarrow$ M3-5 -1800W inverter: by-pass terminals MK3-4 $\leftrightarrow$ MK3-5) Start a wash program. Alarm VAR 03 persists.	<b>NO</b>	Re-connect the power supply cable Go to step 4
		<b>YES</b>	Possible inverter failure. Check the motor and its electrical installation Replace inverter (board A2)
4	Motor connection cabling shortcircuited or diverted to ground. Motor coils shortcircuited or diverted to earth.	<b>NO</b>	Go to step 5
		<b>YES</b>	Rectify the problem
5	Deteriorated bearings or seizing up of the drum or motor rotation	<b>NO</b>	Carry out a general check of the electrical installation. (consult specific information) If the problem is not solved, possible inverter defect: replace inverter (board A2)
		<b>YES</b>	Rectify the problem

### 3.- ANOMALY CAUSED BY OVERVOLTAGE IN INVERTER D.C. BUS

**Alarm codes:**

- control **LC/CC**: VAR 05
- control **IC**: alarm no. 7.

**Description.**

The overvoltage alarm is activated if an excessive increase in the DC bus voltage is produced due to an incorrect power supply voltage or excessive motor overtorque.

**Microprocessor response.**

Prevents or interrupts the execution of the wash cycle.

**Observations.**

Irregularities in the power supply voltage or unstable power supply and ground circuit connections in the washer can also trigger this alarm. Also consult the section on **GENERAL CHECKS**.

Step	Check		Action
1	Stable inverter power supply voltage and of a value between 200 and 240V (tolerance $\pm 10\%$ )	<b>NO</b>	Rectify the problem. (also consult section 1.- COMMUNICATION ALARM)
		<b>YES</b>	Go to step 2
2	Phase failure in the motor power supply caused by deterioration to the wiring, connections or motor coils. (check with an RMS amperometer) Other motor defects.	<b>NO</b>	Go to step 3
		<b>YES</b>	Rectify the problem
3	Deteriorated bearings or seizing up of the drum or motor rotation.	<b>NO</b>	Carry out a general check of the electrical installation. (consult specific information) If the problem is not solved, possible inverter defect: replace inverter (board A2)
		<b>YES</b>	Rectify the problem

## 4.- ANOMALY CAUSED BY MOTOR OVERTEMPERATURE

### Alarm codes:

- control **LC/CC**: VAR 04.
- control **IC**: alarm no. 6.

### Description.

The motor overtemperature alarm is activated by the disconnection of the motor's thermal protection (Klixon)

### Microprocessor response.

Prevents or interrupts the execution of the wash cycle.

Step	Check		Action
1	Continuity of the motor's thermal protection circuit when the alarm is triggered. Check the continuity of the circuit at the extremes of the connection to the inverter - 600W inverter: MK3-4↔MK3-5 - 1800W inverter: MK- 3↔MK- 4	<b>YES</b>	Possible inverter failure. Replace inverter (board A2)
		<b>NO</b>	Go to step 2
2	Reconnection in 15 minutes or less	<b>NO</b>	Go to step 3
		<b>YES</b>	Go to step 4
3	Failure in cabling or motor's thermal protection circuit connection	<b>NO</b>	Possible motor failure. Replace motor
		<b>YES</b>	Rectify defect
4	Deteriorated bearings or seizing up of the drum or motor rotation.	<b>NO</b>	Go to step 5
		<b>YES</b>	Rectify defect
5	Phase failure in the motor caused by deterioration to the cabling, connections or motor coils. (check with an RMS amperometer) Other motor defects.		Rectify defect If motor failure is detected, replace motor

**5.- ANOMALY CAUSED BY INVERTER OVERTEMPERATURE**
**Alarm codes:**

- control **LC/CC**: VAR 06.
- control **IC**: alarm no. 8.

**Description.**

The inverter overtemperature alarm is activated when the inverter temperature exceeds a predetermined value

**Microprocessor response.**

Prevents or interrupts the execution of the wash cycle.

Step	Check		Action
1	Fan motor rotation	<b>NO</b>	600W inverter: go to step 2 1800W inverter: go to step 4
		<b>YES</b>	Dirt on the inverter fan blades. Blockages in air conduits or ventilation grilles Dirt on the surface of the inverter radiator Excessive room temperature.
2	(600W inverter) Check voltage in connection terminals of inverter box fan. Correct value 5V.DC.	<b>NO</b>	Go to step 3
		<b>YES</b>	Possible fan failure Replace fan.
3	(600W inverter) Check voltage in output terminals of microprocessor board (A1). Correct value 5V.DC.	<b>NO</b>	Possible microprocessor board failure Replace microprocessor board (A1)
		<b>YES</b>	Check wiring and connection terminals
4	(1800W inverter) Check voltage in fan connection terminals at relay KA1. Correct value: value of inverter connection.	<b>YES</b>	Possible fan or connection wiring failure Replace fan.
		<b>NO</b>	Rectify the problem

## 6.- GENERAL CHECKS OF ELECTRICAL INSTALLATION RELATED TO THE INVERTER OTHER ANOMALIES RELATED TO THE INVERTER

### Washers with 600W inverter

#### Description.

Action suitable:

- when alarms are triggered or anomalies related to the microprocessor, inverter and motor combination are observed, without any apparent cause.
- when the motor fails to work without any corresponding alarm report
- during periodic maintenance actions

#### **CAUTION!**



The steps detailed below have a serious impact on the workings of the inverter and can lead to irreparable damage. Pay particular attention when checking:

- Unstable connections in the electrical installation of the washing machine and the mains connection
- Irregularities and disturbances in the power supply voltage.
- Continuity failures or defective connections in the washer's ground circuit
- Failures in the securing of the inverter to the support base.
- Connection and state of the connection cables between the inverter and the motor. This cable is subjected to constant vibrations.

Step	Check	Action
	Power supply voltage of the washer	Check: <ul style="list-style-type: none"> <li>- Stable and even voltage between phases and between each of the phases and neutral (value according to the washer's power supply voltage).</li> <li>- Width and length of conductors according to installation manual.</li> <li>- Ground diversion cable: if in doubt, consult an accredited installer.</li> </ul>
	Connection of the washer to the mains electricity supply.	Connection of the power supply cables and the ground cable at the current input terminals. Check that the terminals: <ul style="list-style-type: none"> <li>- Firmly press upon the cable</li> <li>- Press upon <u>all</u> of the threads that make up the cable.</li> <li>- Only press upon the uncovered tip without pressing upon the insulation.</li> </ul>
	Electrical installation of the connection between the inverter and the motor.	Check: <ul style="list-style-type: none"> <li>- Connectors and connection terminals.</li> <li>- Fit of the cables in the connectors and terminals</li> <li>- Securing of the installation in the respective clamps and supports.</li> <li>- State of the conductors.</li> <li>- Stable and even voltage, without voltage drops in the power supply to the inverter.</li> </ul>

**6. (cont.) GENERAL CHECKS OF THE ELECTRICAL INSTALLATION RELATED TO THE INVERTER AND OTHER ANOMALIES RELATED TO THE INVERTER**

**Washers with 600W inverter**

Step	Check	Action
	<p>Ground connections.</p>	<p>Check ground cables and connection bands.</p> <ul style="list-style-type: none"> <li>- No damage should be visible.</li> <li>- The direction of the bands should absorb the vibrations and the movements of the washer produced during the spin cycle (see image).</li> <li>- The connection points should be firmly tightened</li> <li>- The contact surfaces should be free from rust or any product that could prevent good contact from being made.</li> <li>- Check the securing of the shielded cables to ground via the corresponding clamps.</li> </ul> 
	<p>Ground disconnection switch of the motor (S2) and discharge resistance. The ground disconnection switch of the motor separates the motor earth from the washer earth when the lower front cover of the washer is closed. The discharge resistance regulates the discharge current whilst the motor is running.</p>	<p>Check:</p> <ul style="list-style-type: none"> <li>- Correct operation of switch S2.</li> <li>- Correct discharge resistance. Value 1MΩ</li> <li>- Firm discharge resistance connection.</li> </ul> 
	<p>Securing of the washer covers. The ground conductions are also made via the washer covers.</p>	<p>Check:</p> <ul style="list-style-type: none"> <li>- The joints between the covers and between the covers and the washer base; they should be tight and free from rust or positioning problems which prevent a good contact from being made.</li> <li>- The securing of the inverter support box to the washer base</li> </ul>
	<p>The securing of the inverter board (A2) to the support. The inverter is fixed to the support board using five metal separators which connect the inverter earth to the machine earth</p>	<p>Check:</p> <ul style="list-style-type: none"> <li>- The securing of the entire inverter board to the support.</li> </ul>
	<p>General checks. Some of the problems that affect the correct operation of the inverter-motor combination are produced by moisture or aggressive washing products.</p>	<p>Check:</p> <ul style="list-style-type: none"> <li>- Placement of the inverter box cover</li> <li>- Watertightness of the water conduction tubes.</li> <li>- Correct placement of the dosing unit gasket.</li> <li>- Watertightness of the water and exterior dosing products collector</li> <li>- Presence of water or bath remains in the motor or inverter (visual inspection).</li> <li>- Watertightness of the heaters or of the heater housing sealing plugs (machines without heating).</li> </ul>

## 7.- ANOMALY CAUSED BY INCORRECTLY IDENTIFIED INVERTER

Only in washers with 1800W inverter.

### Alarm codes:

- control **LC/CC**: VAR 09.
- control **IC**: alarm no. 12.

### Description.

Mismatch between the washer model and the inverter configuration.

### Microprocessor response.

Prevents or interrupts the execution of the wash cycle.

### Observations.

The microprocessor identifies the model of the washer from the position of the jumpers on the following connectors:

- control **LC/CC**: jumpers between the connectors **X18** and **X19**.
- control **IC**: jumpers on the connector **X7**.

The inverter configuration is made automatically according to the distribution of the jumpers on connector MK10. Consult the washer's electrical diagram to obtain information about said connectors.

Step	Check		Action
1	Go to the information menu corresponding to the control: - control <b>LC/CC</b> : menu <b>INFO</b> - control <b>IC</b> : <b>Tools</b> of system; menu <b>Enquiries</b> ; <b>General Information</b> . Check that the washer model shown in the display corresponds to the actual model of the washing machine.	<b>NO</b>	Go to step 2
		<b>YES</b>	Go to step 3
2	Jumpers between connectors X18 and X19 in good condition and distributed according to the information in the washer's electrical diagram	<b>NO</b>	Rectify the problem
		<b>YES</b>	Possible microprocessor board failure Replace microprocessor board (A1)
3	Jumpers on connector MK10 in good condition and distributed according to the information in the washer's electrical diagram.	<b>NO</b>	Rectify the problem
		<b>YES</b>	Possible inverter failure Replace inverter (board A2)

## 8.- GENERAL CHECKS OF ELECTRICAL INSTALLATION RELATED TO THE INVERTER OTHER ANOMALIES RELATED TO THE INVERTER

### Washers with 1800W inverter

**Description.**

Action suitable:

- when alarms are triggered or anomalies related to the microprocessor, inverter and motor combination are observed, without any apparent cause.
- when the motor fails to work without any corresponding alarm report
- during periodic maintenance actions

**CAUTION!**

The steps detailed below have a serious impact on the workings of the inverter and can lead to it being destroyed. Pay particular attention when checking:

- Unstable connections in the electrical installation of the washing machine and the mains connection
- Irregularities and disturbances in the power supply voltage.
- Continuity failures or defective connections in the washer's ground circuit
- Failures in the securing of the inverter to the support base
- Connection and state of the connection cables between the inverter and the motor. This cable is subjected to constant vibrations.
- Updates to the machine.

Step	Check	Action
	Power supply voltage of the washer	Check: Stable and even voltage between phases and between each of the phases and neutral (value according to the washer's power supply voltage). Width and length of conductors according to installation manual. Ground diversion cable: if in doubt, consult an accredited installer.
	Connection of the washer to the mains electricity supply.	Connection of the power supply cables and the ground cable to the washer's input switch. Check that the terminals: <ul style="list-style-type: none"> <li>- Firmly press upon the cable</li> <li>- Press upon <u>all</u> of the threads that make up the cable.</li> <li>- Only press upon the uncovered tip without pressing upon the insulation.</li> </ul>
	General checks. Some of the problems that affect the correct operation of the inverter-motor combination are produced by moisture or aggressive washing products.	Check: <ul style="list-style-type: none"> <li>- Placement of the inverter box cover</li> <li>- Watertightness of the water conduction tubes.</li> <li>- Correct placement of the dosing unit gasket.</li> <li>- Watertightness of the water and exterior dosing products collector</li> <li>- Presence of water or bath remains in the motor or inverter (visual inspection).</li> <li>- Watertightness of the heaters and of the heater housing sealing plugs (machines without heating).</li> </ul>
	Electrical installation of the connection between the inverter and the motor.	Check: <ul style="list-style-type: none"> <li>- Connectors and connection terminals.</li> <li>- Fit of the cables in the connectors and terminals</li> <li>- Securing of the installation in the respective clamps and supports.</li> <li>- State of the conductors.</li> <li>- Stable and even voltage, without voltage drops in the power supply to the inverter.</li> </ul>

**8. (cont.) GENERAL CHECKS OF THE ELECTRICAL INSTALLATION RELATED TO THE INVERTER AND OTHER ANOMALIES RELATED TO THE INVERTER**  
**Washers with 1800W inverter**

Step	Check	Action
	Ground connections.	Check ground connection cables. <ul style="list-style-type: none"> <li>- No damage should be visible.</li> <li>- The connection points should be firmly tightened</li> <li>- The contact surfaces should be free from rust or any product that could prevent good contact from being made.</li> <li>- Check the securing of the shielded cables to ground via the corresponding clamps.</li> </ul>
	The securing of the inverter board (A2) to the support box. The inverter is fixed to the support board using six separators. Models HS / MS: six metal separators Models EH / EM: five isolated separators and a metal separator (consult position of metal separator <b>(A)</b> in figure 1)	Check: <ul style="list-style-type: none"> <li>- The correct distribution of the separators.</li> <li>- The securing of the entire inverter board to the support.</li> </ul>
	Models EH and EM.  Installation of CEM filter (consult code in machine parts view)	In case this is not fitted at the time of manufacture, updating the machine and installing this filter to protect the inverter against voltage and intensity spikes is recommended. Placement of filter <b>(B)</b> : consult figure 2.

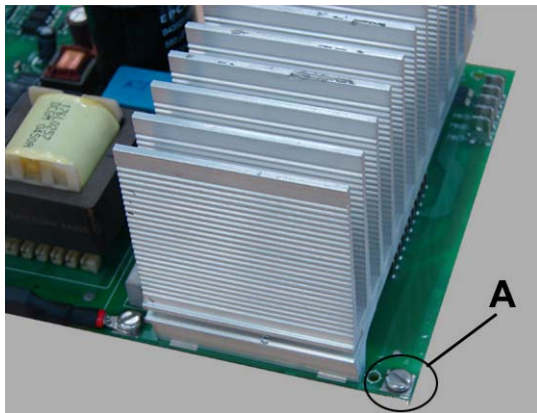


fig. 1

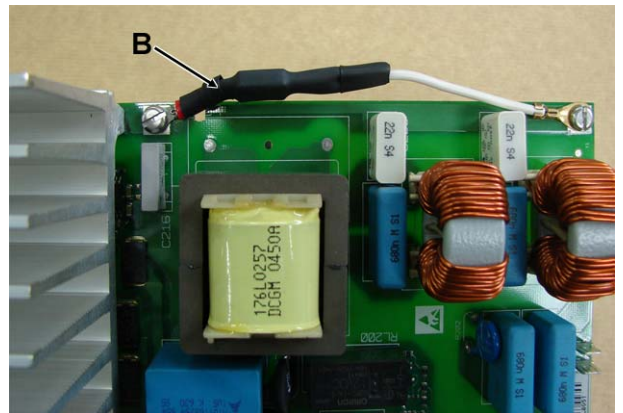


fig. 2